DIFFERENTIAL IMPULSE CONVEYOR AND METHOD

Patent number:	WO9733818
Publication date:	1997-09-18
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Classification:	
- international:	B65G25/00
- european:	B65G27/12; B65G27/20; B65G27/30; B65G27/32
Application number:	WO1997US03879 19970312
Priority number(s):	US19960616448 19960315

Also published as:

EP0925241 (A1
US5794757 (A1
G B2324074 (A)
EP0925241 (A4
EP0925241 (B1

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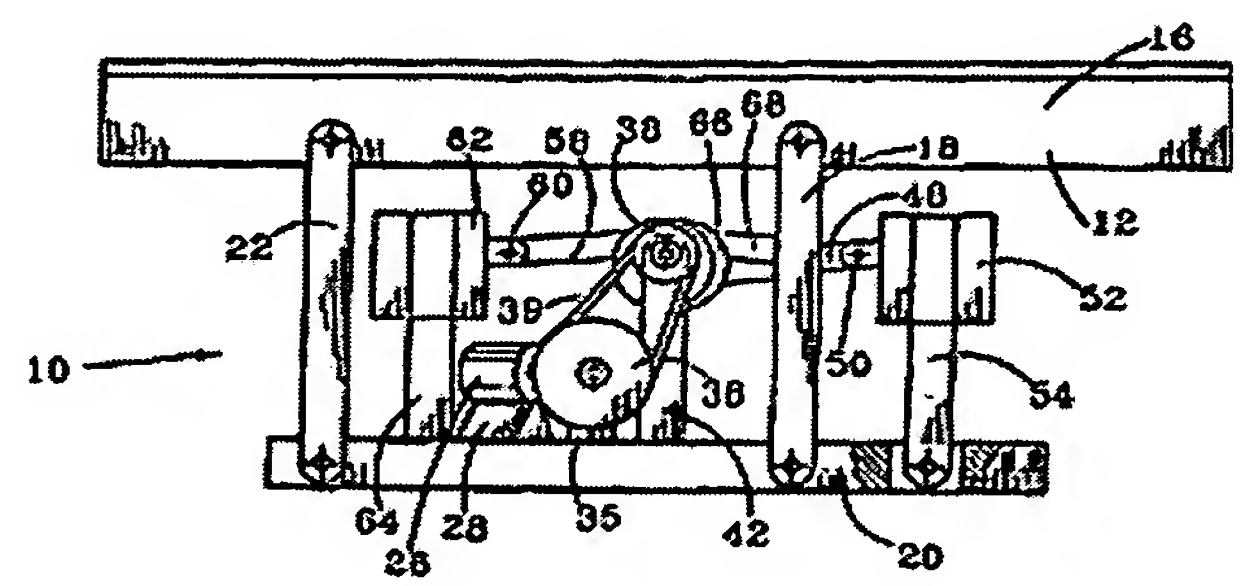
Abstract of **WO9733818**

A differential impulse conveyor (10, 80, 90, 100) includes a tray (12) which is driven in a forward direction at a slow speed and a backward direction at a higher speed to slide goods with respect to the tray and thereby move goods along the tray. The drive motor (26, 27) powers the tray in the forward and backward directions through a drive shaft (40) and a tray crank (66, 106) interconnecting the drive shaft and the tray. Controller (84) is provided for varying the rotational speed of the motor shaft, thereby avoiding mechanical knock in the drive system. In another embodiment, a pair of counterweights (52, 62) are provided on opposing sides of the drive shaft (40), with respective counterweight cranks (46, 56) initiating forward movement of each counterweight at a preselected offset angular position with respect to forward movement of the tray. The differential impulse conveyor and method of the present invention substantially eliminates mechanical knocking in the drive system, thereby extending the useful life of the conveyor and minimizing the size of the conveyor components.



CLAIMS

[Claim(s)]
1. Differential Impulse Mold Conveyor for Moving Article -- Setting -- And it is Movable Tray in after ****** at 2nd Larger Rate than this 1st Rate. 1st Rate -- before ****** -- The tray which has moved the article to ****** before this along with this tray, and drive motor for moving this tray to ****** before this, and after [this] ****** It is the 1st rate between each 1st rotational half cycle. The pivotable drive shaft which can give power with this drive motor for rotating at the 2nd larger rate than this 1st rate between each 2nd rotational half cycle, The tray crank which is a tray crank which had between this drive shaft and these trays linked, and puts migration to the front of this tray into operation by the angular position as which this shaft was chosen, As opposed to this tray respectively each with two or more movable counter weight Two or more counter weight cranks which have linked this drive shaft and each one of these two or more of the counter weight are provided. Each counter weight crank The differential impulse mold conveyor characterized by putting ****** into operation in a location here and there before each counter weight whenever [offset angle / as which this drive shaft was beforehand chosen to the both sides of another side of the angular position and these two or more counter weight cranks with which this drive shaft was this chosen].
2. Location is Relational Expression Substantially whenever [Offset Angle / as which this Drive Shaft was this ** Chosen in Differential Impulse Mold Conveyor of Claim 1]. :

$$OA = \frac{(360°)}{(N+1)}$$

It is the differential impulse mold conveyor which is come out of and specified and is characterized by for OA being a location and N being the number of counter weight whenever [this offset angle] here.
3. In Differential Impulse Mold Conveyor of Claim 1 These Two or More Counter Weight Consists of 1st Counter Weight and 2nd Counter Weight. and -- These two or more counter weight cranks consist of the 1st counter weight crank and the 2nd counter weight crank. This 1st counter weight crank is linked with this drive shaft and this 1st counter weight by whenever [offset angle / of about 120 degrees] to the angular position as which this drive shaft was this chosen. This 2nd counter weight crank is a differential impulse mold conveyor characterized by linking with this drive shaft and this 2nd counter weight whenever [offset angle / of about 240 degrees] in the location to the angular position as which this drive shaft was this chosen.
4. Each weight of two or more of these counter weight is a differential impulse mold conveyor characterized by being chosen so that the maximum momentum of each counter weight may become equal substantially in the differential impulse mold conveyor of claim 1 at the maximum momentum of this tray.
5. The differential impulse mold conveyor of claim 1 is . The base for supporting the at least 1 section of this tray is provided. Each of two or more of these counter weight is a differential impulse mold conveyor characterized by being supported by the pivot type on this base.
6. the differential impulse mold conveyor of claim 1 -- further -- the base for supporting the at

least 1 section of this tray -- and -- Differential impulse mold conveyor by which each is characterized by providing the 1st pair by which one edge is connected with this base by the pivot type, and one edge which faces is connected with this tray by the pivot type, and a pair of 2nd arm in order to support this tray.
7. The differential impulse mold conveyor of claim 6 is . Differential impulse mold conveyor characterized by providing the tray crank arm which links this tray crank and the arm of this 1st pair.
8. In the differential impulse mold conveyor of claim 1, these two or more counter weight cranks Each is supported on this drive shaft and they are two or more pivotable eccentric cranks in this drive shaft. Differential impulse mold conveyor characterized by having two or more crank arms with which each links one of these two or more of the eccentric cranks, and each one of these two or more of the counter weight.
9. the differential impulse mold conveyor of claim 1 -- further -- the shaft driven with this drive motor -- and -- every of rotation -- between the 1st half cycle -- the 1st rate -- and every of rotation -- differential impulse mold conveyor characterized by having the universal joint which links this shaft and this drive shaft in order to turn this drive shaft at the 2nd rate between the 2nd half cycle.
10. Differential Impulse Mold Conveyor of Claim 9 is . Intermediate Shaft Which it is Mechanically Positioned between this Shaft and this Drive Shaft, and is Rotated by this Universal Joint, Pulley for a drive rotated by this intermediate shaft The driven pulley for rotating this drive shaft, and -- It has the flexible belt which links this pulley for a drive, and this driven pulley. This pulley for a drive and this driven pulley are a differential impulse mold conveyor characterized by having become the dimension which this drive shaft rotates by the twice of the rotational speed of this intermediate shaft.
11. Differential Impulse Mold Conveyor for Conveying Article -- Setting -- And it is Movable Tray in after ****** at 2nd Larger Rate than this 1st Rate. 1st Rate -- before ****** -- Tray which has moved the article along with this tray The drive motor which gives power to a shaft, The controller for controlling this rotational speed of this shaft, in order to rotate this MOTASHAFUTO ** at the 2nd larger rate than this 1st rate between the 2nd turnover period at the 1st rate between the 1st turnover period, The tray crank which links this shaft and this tray, s of each receive this tray. One or more movable counter weight, and -- each -- this shaft -- this -- differential impulse mold conveyor characterized by providing one or more counter weight cranks which link each one of the one or more counter weight.
12. It is the differential impulse mold conveyor characterized by being an electric-motor controller for this controller controlling the rotational speed of this shaft in the differential impulse mold conveyor of claim 11.
13. It is the differential impulse mold conveyor characterized by this controller controlling the maximum rotational speed of this shaft 2.2 to 2.6 of the minimum rotational speed of this shaft times in the differential impulse mold conveyor of claim 11.
14. It is the differential impulse mold conveyor characterized by this controller controlling this rotational speed of the this shaft between this 2nd turnover period between this 1st turnover period corresponding to the 1st half cycle of rotation of this shaft, and corresponding to the 2nd half cycle of rotation of this shaft in the differential impulse mold conveyor of claim 11.
15. In the differential impulse mold conveyor of claim 11 The this shaft between this 1st turnover period to which each exceeds a period required for one perfect rotation of this shaft, and this 2nd turnover period is rotated, and this controller is this conveyor. Differential impulse mold conveyor characterized by having the worm gear device which links this drive motor and this tray crank.
16. The differential impulse mold conveyor by which the differential impulse mold conveyor of claim 11 is characterized by having the attenuation unit mechanically linked to this shaft in order to attenuate drive movement of this shaft further.
17. Differential Impulse Mold Conveyor for Conveying Article -- Setting -- And it is Movable Tray in after ****** at 2nd Larger Rate than this 1st Rate. 1st Rate -- before ****** -- Tray which has moved the article along with this tray The drive motor which gives power to a shaft,

Eccentric pulley for a drive rotated by this drive motor Between each 1st rotational half cycle, at the 1st rate And the pivotable drive shaft which was able to give power by this eccentric pulley in order to rotate at the 2nd larger rate than this 1st rate between each 2nd rotational half cycle, The tray crank which carries out eccentricity by this drive shaft, is rotated, and links this drive shaft and this tray, s of each receive this tray. One or more movable counter weight, s of each make it rotate by this drive shaft -- having -- and a drive shaft -- this -- with one or more counter weight cranks which link each one of the one or more counter weight The flexible belt which links eccentric this pulley for a drive, and this drive shaft, and -- Differential impulse mold conveyor characterized by providing the eccentric compensator for jointing with this flexible belt in order to maintain the rotational speed beforehand decided substantially [this drive shaft] to this shaft.
18. The differential impulse mold conveyor of claim 17 is . Differential impulse mold conveyor characterized by having the driven eccentricity pulley which was installed in this drive shaft and linked with this eccentric pulley for a drive with this flexible belt.
19., and it is this Eccentric Compensator. 1st Makeup Pulley Which Eccentricity is Carried Out to 1st Shaft, and it is Installed, and is Driven with this Flexible Belt, [Differential Impulse Mold Conveyor of Claim 18] Carried out eccentricity to the 2nd shaft, and it was installed, and has the 2nd makeup pulley driven with this flexible belt. In order to maintain uniform rotation substantially [this driven pulley] by this driving pulley through a flexible belt It is the differential impulse mold conveyor characterized by these 1st and 2nd pulleys having the eccentricity as which each was chosen so that eccentric rotation of this driving pulley and this driven pulley may be compensated.
20. It is the differential impulse mold conveyor characterized by axis of rotation of axis of rotation of this driving pulley, axis of rotation of this driven PU **, axis of rotation of this 1st pulley, and this 2nd pulley being substantially in agreement with the point of a virtual square in the differential impulse mold conveyor of claim 19.
21. the differential impulse mold conveyor of claim 17 -- setting -- this eccentric compensator The makeup pulley which eccentricity is carried out, and it is installed on a makeup pulley shaft, and drives with this flexible belt, the movable makeup pulley supporter for installing this makeup pulley shaft pivotable -- and -- uniform tension is maintained substantially on this flexible belt -- as -- this -- differential impulse mold conveyor characterized by to have a biased member for acting on a movable makeup pulley supporter.
22. This eccentricity of this pulley rotated by this shaft in the differential impulse mold conveyor of claim 17 is a differential impulse mold conveyor characterized by controlling the maximum rotational speed of this drive shaft 2.6 times from 2.2 times of the minimum rotational speed of this drive shaft.
23. It is the differential impulse mold conveyor which eccentricity of this eccentric compensator is carried out to a makeup shaft, and it is installed in the differential impulse mold conveyor of claim 17, and is characterized by being this eccentric pulley and out of phase in order that it may have the makeup pulley rotated with this flexible belt and this makeup pulley may compensate this eccentric rotation of this eccentric pulley.
24. The differential impulse mold conveyor characterized by equipping the differential impulse mold conveyor of claim 17 with the worm gear device which links this drive motor and this eccentric pulley further.
25. Differential Impulse Mold Conveyor for Conveying Article -- Setting -- And it is Movable Conveyor Tray in after ****** at 2nd Larger Rate than this 1st Rate. 1st Rate -- before ****** -- Tray which has moved the article along with this tray Two or more supporters with which each for supporting this conveyor tray was connected with the base at the pivot type, The drive motor which gives power to one or more of these two or more of the supporters in order to transmit movement to this tray, The member for a lock for connecting this conveyor tray with these two or more supporters alternatively, Release member for canceling the activation actuation to this member for a lock Differential impulse mold conveyor characterized by providing the tray supporter for guiding movement of this conveyor tray to these two or more supporters when this release member cancels the activation actuation to this member for a lock.

26. The differential impulse mold conveyor of claim 25 is . It is the differential impulse mold conveyor characterized by having jointed with this thin **** flange in order that it might be supported on this tray containing the long and slender flange extended outside from this tray side, and one pair of two or more supporters, it may have this tray supporter extended between these supporters and this tray supporter may guide movement of this conveyor tray to these two or more supporters.
27. It is the differential impulse mold conveyor characterized by having a clamp bar for jointing this member for a lock with this thin **** flange of this conveyor tray compulsorily in the differential impulse mold conveyor of claim 26.
28. It is the differential impulse mold conveyor characterized by having the superior lamella with which it inclined for sliding movement of this thin **** flange of this conveyor tray when this release member had activation actuation canceled [supporter / this / tray] in the differential impulse mold conveyor of claim 26.
29. the differential impulse mold conveyor of claim 25 -- setting -- this member for a lock the one or more halt sections by which each was fixed to this tray -- and -- in order to connect this tray with these two or more supporters -- this -- differential impulse mold conveyor characterized by having these two or more supporters and one or more movable jointing members for alternative jointing with the one or more halt sections.
30. The differential impulse mold conveyor of claim 25 is . Differential impulse mold conveyor characterized by having two or more rollers for enabling movement of this tray to the supporter of this plurality [time / of supporting this conveyor tray and this release member having activation actuation canceled].
31. The differential impulse mold conveyor of claim 25 is . Differential impulse mold conveyor characterized by having one or more counter weight which each is movable and drives with this drive motor to this conveyor tray.
32. The differential impulse mold conveyor of claim 25 is . Differential impulse mold conveyor characterized by having an adjustment device for adjusting alternatively the location of this tray to these two or more supporters when this member for a lock connects this tray with these two or more supporters.
33. In Approach of Conveying Article Process Which Supports Movable Tray to before ****** and after ******, The process which controls the rotational speed of shaft is provided. Are the 1st rate between the 1st turnover period, and he is trying for this control process to rotate this shaft at the 2nd larger rate than the this 1st rate between the 2nd turnover period. The process which links this shaft and this tray further, process in which each supports one or more movable counter weight to this tray this shaft -- this -- approach of conveying the article characterized by providing the process which links each of one or more counter weight.
34. The approach this rotational speed of this shaft conveys the article characterized by being controlled so that the maximum rotational speed of this shaft becomes 2.6 times from 2.2 times of the minimum rotational speed of this shaft in the approach of claim 33.
35. The approach of claim 33 is . How to convey the article characterized by providing the process linked with this shaft and this tray crank that has a worm gear device.
36. How for this 1st turnover period of this shaft to happen between the 1st half cycle of rotation of this shaft in the approach of claim 33, and to convey the article characterized by the 2nd turnover period of this shaft happening between the 2nd half cycle rotations of this shaft.
37. In the Approach of Moving Article Although Process Which Supports Movable Tray to before ****** and after ****** is Provided The article is moved along with this tray. Between each 1st rotational half cycle, at the 1st rate further And the process in which a drive shaft is rotated at the 2nd larger rate between each 2nd rotational half cycle than this 1st rate, The process which links this drive shaft and this tray in order to put migration to the front of this tray into operation by the angular position as which this drive shaft was chosen, The process in which s of each support two or more movable counter weight to this tray, In order to put migration to the front of each counter weight into operation in a location whenever [offset angle / as which this drive shaft was beforehand chosen to the both sides of the angular position and two or more of other

counter weight as which this shaft was chosen] How to move the article characterized by providing the process which links this drive shaft and each of two or more counter weight.
38. In the Approach of Claim 37 These Two or More Counter Weight Consists of 1st Counter Weight and 2nd Counter Weight. and -- With the process which links this drive shaft and this 1st counter weight by whenever [offset angle / of about 120 degrees] to the angular position as which this drive shaft was chosen How to move the article characterized by providing the process which links this drive shaft and this 2nd counter weight whenever [offset angle / of about 240 degrees] in a location to the angular position as which this drive shaft was chosen.
39. The approach of claim 37 is . How to move the article characterized by providing the process which supports each of two or more of these counter weight at a pivot ceremony to the arm for support.
40. the approach of claim 37 -- further -- at least one pair of arms -- each one edge -- a conveyor base -- and the approach of moving the article characterized by one edge which faces possessing the process connected with a pivot type on this tray.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
Technical field to which a differential impulse mold conveyor and approach invention belong This invention relates to the differential impulse mold conveyor for moving an article along with the tray (tray) of a conveyor. Especially this invention relates to the drive with which it was improved for giving power to a differential impulse mold conveyor by the method of decreasing vibration within the tray of a drive and this conveyor which is not desirable, and a mechanical knock (knock).
Background technique of invention The differential impulse mold conveyor is equipped with the tray or tray (pan) as for which having an even front face for conveying an article on it inclined it to be level in general long and slender or small.
Although it lengthens back at a high return rate so that it may be late moved to the front and this article may subsequently slide along with this tray in order that this tray may carry this article to this tray, this conveys this article effectively along with this conveyor tray. The differential impulse mold conveyor occasionally quoted as a linear motion conveyor is prominent in [conveyor / of other classes like a reciprocation conveyor (reciprocating conveyors), a shuffle conveyor (shuffle conveyors), an oscillatory type conveyor, or a shaker conveyor (shaker conveyors)] actuation. The important advantage of a differential impulse mold conveyor is being able to convey along with a single tray (there being no tray components which move) by method which does not damage the article which is easy to break. therefore, a differential impulse mold conveyor -- the cleanliness of a conveyor, and the low noise -- and when it desires to want to make product breakage into min etc., application of many like food handling has been fond.
The drive of a differential impulse mold conveyor performs the acceleration and moderation which this tray repeated. The acceleration of ****** before original is lower than the acceleration of after ******, and only when this tray is substantially lengthened at a high return rate back by that cause, an article slides along with this tray. The device of the conventional technique of one mold of driving a differential impulse mold conveyor is equipped with two or more flywheels by which suspension was carried out from this conveyor tray so that ****** and a high return rate might be attained here and there the late front where the momentum of the flywheel to rotate is desirable on these conveyor trays. This flywheel drive is expensive, and in order to attain the desirable product rate which meets this conveyor tray, optimization of it is easily impossible in adjustment of the ratio of advanced speed and a return rate.
The differential amelioration-type mold conveyor is indicated by United States patent No. (it is called '807 patent for short below) 5,351,807. In order to attain one half cycle rotation of this drive shaft in the high speed following one half cycle rotation of the drive shaft in a late rate, the universal joint with an include angle (angled universal joint) combined with the rate increase machine of 1:2 is being used for the drive of this conveyor. In order to attain desirable conveyor movement, the crank has linked this drive shaft and this tray. This include angle of this universal joint and the rate of this motor are adjusted so that product migration length which meets this conveyor tray may be made into max. Counter weight drives by this drive shaft so that a phase may be removed about 180 degrees with movement of a **** conveyor tray and it may move, and this is decreasing substantially the conveyor vibration and the mechanical knock in this drive

system which are not desirable. Moreover, it may be useful to a damping function, and an oil pressure fluid pump may be driven with this drive shaft so that the knock in this drive may be decreased further.
Although the technique indicated by this '807 patent propelled adoption of a differential impulse mold conveyor considerably, amelioration which decreases or removes the mechanical knock in this drive system further is desired. By them, the fluid for oil pressure is preferably evaded from contamination or the worries on insurance by the attenuation by oil pressure at application of many food-processing sides. The dimension of conveyor driving parts, therefore cost can be decreased without having a bad influence on the use life of this conveyor by decreasing the mechanical knock in this drive further. It is desirable to drive this conveyor by the motor made to rotate a shaft at a rate much higher than the rate which the half cycle drive shaft which this changes in some application articles is expected. optimization of this drive -- a reciprocation conveyor, a shuffle conveyor, and an oscillatory type conveyor -- or adoption of a differential impulse mold conveyor is further increased as a practical substitute of a shaker conveyor -- I will come out.
Another problem in the conveyor designed so that an article might be moved along a level front face substantially [a tray] with a differential impulse or the technique of vibration is related with the difficulty of moving this tray so that the range under this tray can be cleaned easily. Although this drive is typically dismountable from this conveyor tray, this drive is removed from this tray, it separates from this drive for cleaning, this tray is moved, and re-attaching this drive subsequently to this tray requires the time amount of ******, and skill. Moreover, the conveyor tray which supplies an article to a scale or a weighting level gage needs precise positioning of this tray because of the optimal supply to this scale or a weighting level gage. In order to reduce time amount required in order to clean the range under this tray, this whole conveyor including this tray and this drive has been supported so that it may be movable on a rail.
Therefore, the conveyor assembly of the weight exceeding hundreds of kg (thousands of pound) is pulled out along with this rail for cleaning, and, subsequently to the suitable location of opposite Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne., is pulled back by this scale. Moving this conveyor in this way for cleaning, and spending the costs of ****** in subsequently re-positioning this conveyor appropriately to this scale.
These faults of the conventional technique are conquered by this invention. The drive for differential impulse mold conveyors which decrease in number the differential impulse mold conveyor and mechanical knock which were improved so that desirably is indicated below. In option, this shaft enables it to turn this drive at a much larger rate than this drive shaft, and, thereby, they are decreasing in number the cost of this conveyor drive.
Outline of invention The differential impulse mold conveyor equips before ****** with the movable tray at the 2nd larger rate than this 1st rate at the 1st rate at after ******, in order to move an article to before ****** along with a tray. In the one example of this invention, between the next half cycles of subsequently rotation at a rate with this conveyor drive late between one half cycle of rotation of a drive shaft, it has the universal joint which changes a fixed rotational speed into the rotational speed from which a drive shaft changes substantially [a shaft] so that it may rotate at a quick rate. The crank is connected between this drive shaft and this tray so that this conveyor may be pushed ahead late and this conveyor may subsequently be lengthened quickly back. In order to decrease overrun knocking in this conveyor drive (overrun knocking), two movable counter weight is supplied for each to this tray. This tray and each counter weight may be supported by the pivot type from a base by the in general perpendicular arm for support which makes a pair. Two or more counter weight cranks which correspond in order to put [here and there before the beginning of this tray] ****** into operation whenever [offset angle / of 120 degrees] to ****** here and there before this counter weight in a location have linked each counter weight with this drive shaft.
In another example of this invention, it is the 1st rate between the 1st turnover period, and in order to control the rotational speed of this shaft to rotate a shaft at the 2nd larger rate than this 1st rate between the 2nd turnover period of the persistence time equal to this 1st period, the electronic controller is supplied. This controller and a motor may be together put so that it

may be equivalent also to the servo motor and functional target which were programmed also in actuation. This universal joint is unnecessary by controlling the rotational speed of this shaft directly. This shaft may be directly connected with one or more counter weight cranks with which the tray crank and each for moving this tray are linked with each counter weight. Instead, in order to rotate this tray crank and one or more counter weight cranks, a torque multiplication machine or a rate reduction machine may be supplied between this shaft and this drive shaft, and thereby, the advantage of the motor of cheaper cost is acquired at high speed. In order to hold an overrun load in the example of this latter, the worm gear whose backlash is zero substantially as this torque multiplication machine is desirable.
A linkage is supplied in order that each may support this tray between a pair of arms for support connected with the base at the pivot type. When this conveyor cannot give power, this linkage may be released so that this tray may slide on a longitudinal direction to this arm for support, and it takes into consideration making easy cleaning of the whole region which is usually under this tray by that cause. Subsequently, this tray slides, is returned to the location of the origin of it, and is re-connected with this arm for support. In order to position this tray in a longitudinal direction desirably to a scale, the longitudinal direction location of this tray enables it to adjust [as opposed to / therefore / this arm for support] this linkage easily to this conveyor base further.
The purpose of this invention is offering the improved differential impulse mold conveyor which makes min the mechanical knock by the overrun load in this drive. It is comparatively cheap and offering the differential impulse mold conveyor by which neither maintenance nor repair becomes high cost is the purpose to which this invention relates.
The specific descriptions of this invention are two or more things which drive by the drive shaft at which each drives this conveyor tray and for which two counter weight is used preferably. In order to put ****** into operation by the angular position as which this drive shaft was chosen here and there before this tray, a tray crank links this drive shaft with this tray. Although each counter weight is linked by this drive shaft with the counter weight crank, this crank puts ****** into operation here and there before each counter weight by the angular position as which this drive shaft was beforehand chosen to the angular position as which it was chosen for putting ****** into operation here and there before this tray. Each counter weight is good to have the weight chosen so that the maximum momentum of each counter weight might become equal substantially with the maximum momentum of this tray.
Another description of this invention is that a controller is used in order to control the rotational speed of a shaft to rotate this shaft at the 2nd larger rate than this 1st rate between the 2nd turnover period at the 1st rate between the 1st turnover period. In order to connect with the shaft of the rate from which this tray crank and one or more counter weight cranks change directly or to link the both sides of this tray crank and one or more counter weight cranks, it may be used between the shaft of the rate from which a torque converter (rate reduction machine) changes, and the drive shaft of the changing rate. The description to which this invention progressed further is using a worm gear as a torque converter between the shafts of a rate and these drive shafts which this change, in order to make backlash and the overrun load to this drive shaft into min.
The description to which this invention progressed further is using it, since the drive for these differential impulse mold conveyors drives substantially both a level tray, inclined tray which has an even tray front face, or conveyor tray which presents a spiral mold perpendicularly. In addition, another description is that the drive of this differential impulse mold conveyor can transform an article easily so that the rate of this invention moved along with this conveyor tray may be changed.
In addition, it is used in order that the flexible belt which has linked the eccentric pulley and this eccentric pulley to which another description's is turned by this drive motor, and this drive shaft of this invention may attain the changing rate with this desirable drive shaft. This drive shaft is connected with this tray, and rotates the tray crank installed by carrying out eccentricity, and one or more counter weight cranks with which each is driving each counter weight and which were installed by carrying out eccentricity. In order to maintain the relation beforehand decided

on between each rotations of this drive shaft and this shaft, a makeup pulley or other eccentric compensators act on this flexible belt.
In addition, another description is a linkage for supporting a conveyor tray between the arms for support which accomplish the pair which separated and left while [this invention] each was connected with the base at the pivot type. Even if this tray is supported in addition on this arm for support so that the range under this tray can clean easily, it enables it to move this linkage to a longitudinal direction from the location. The **** linkage enables inspection, periodical adjustment, or service of this conveyor drive. This tray can slide on the location of the origin of it easily, and after cleaning can return it to it, and if required, it can also adjust the longitudinal direction location of this tray easily.
The drive of this differential impulse mold conveyor is comparatively easy, therefore although manufactured, it is cheap, and it is the advantage of this invention for it to be easy to perform maintenance. The Yoshinari ****** of the cost of a drive was carried out by offering the drive of a fraction article comparatively. If it is used in order that two or more counter weight may decrease knocking substantially, or in order to remove, this conveyor will be driven with high dependability according to the increment device in a rate of the motor of a conventional type, a universal joint, and 1:2.
The purpose and the description which progressed to these lists of this invention further, and the advantage will become clear from the following detail explanation which referred to drawing of the accompanying drawing.
Easy explanation of a drawing Drawing 1 is the top view of one example of the differential impulse mold conveyor of this invention which removed the part of a conveyor tray for clarification of a drive.
Drawing 2 is the side elevation of the differential impulse mold conveyor shown in drawing 1 .
Drawing 3 is the side elevation of another example of the differential impulse mold conveyor of this invention by which it is used in order that an electric controller may change the rate of a shaft, and the tray crank and the counter weight crank are directly connected with this shaft.
Drawing 4 is a top view of this invention where it was used in in order that a controller might change the rate of a shaft, and the worm-gearing style has linked this drive shaft in this shaft list and which is another example in addition.
Drawing 5 is the top view of the example instead of this invention used in order for the eccentric pulley and flexible belt which rotate by this shaft to rotate this shaft.
Drawing 6 is the side elevation of this differential impulse mold conveyor shown in drawing 5 .
Drawing 7 is a graph which draws a tray rate on a tray migration length list as a function of the angular position of this shaft.
Drawing 8 is a graph which draws crank torque on a tray acceleration list as a function of the angular position of this shaft.
drawing 9 illustrates the suitable linkage to which this tray is linked with one pair of arms for support, and can be moved to a longitudinal direction for cleaning, and it can be made to enable it to return it subsequently to the location of the origin of it -- it is a pictorial view with a cross section a part.
Drawing 10 is a side elevation illustrating another example of the tray linkage of this invention which links this tray with two or more supporters.
Detailed explanation of a desirable example Although drawing 1 and drawing 2 are drawing one example of the differential impulse mold conveyor 10 of this invention, this example contains the long and slender tray 12 which can give power with a drive motor 26. In the example of drawing 1 and drawing 2 , this tray 12 has the cross-section configuration of in general U character type which has the side faces 14 and 16 which separated between the even back face for sliding jointing with the article conveyed, and one pair of conventional types. an article -- general -- level -- and a downward slope type -- or it should be evaluated that the back face of this tray may incline slightly from the horizontal so that it can move to an uphill type. This conveyor tray may be designed with a spiral mold tray as indicated with United States patent No. 5,351,807. This drive indicated here is applicable so that it may follow and a conveyor with a straight-line-like level tray, a straight-line-like inclination tray, or a spiral mold tray may be driven.

A differential impulse mold conveyor moves this tray 12 to before ****** sufficiently late so that it moves together with this tray rather rather than a product slides on the back-face top of this tray. . Subsequently, this tray is lengthened to after ****** sufficiently quickly so that this product slides on this tray. It is late ahead of this tray, and the force of the direction which carries out the phase contrary so that it may explain below among both quick migration back is impressed by this drive. If this tray subsequently moves to the front back by the method of rapid acceleration and moderation, the looseness of this drive will appear as an unpleasant knock.
This conveyor drive 24 contains the electric motor 26 installed in the motor supporter 28 attached in this base 20. Although a shaft rate may be controlled as indicated to U.S. Pat. No. 5351807 in order to optimize the migration length of the article which met this tray about the example drawn on drawing 1 and drawing 2 , the output of this motor 26 drives the shaft 30 of the **** constant speed which is homogeneity. Another shaft 34 has attached the include angle to the shaft 30, is linked by the universal joint 32, and, thereby, has produced a changing desirable rotational speed of a shaft 34. As the **'807 patent explained, in order to optimize the migration length of the article which met this conveyor tray, the include angle between the axis 76 of a shaft 30 and the axis 74 of a shaft 34 may also change.
It rotates by the shaft 34, and since a belt 40 (39) rotates a shaft 40 with a shaft twice the rate of 34, a pulley 36 links pulleys 36 and 38. For the operation which this universal joint generates, the rate of a shaft 34 changes cyclically between a late rate / quick rate twice per rotation of a shaft 34. therefore -- since this pulley is made into a dimension which produces one rotation of the late desirable rate of a shaft 40, and one rotation of a quick rate during each rotation of a shaft 40 -- a shaft 40 -- every of rotation -- the inside of the 1st half cycle -- the first rate -- rotating -- every of rotation -- the inside of the 2nd half cycle rotates at the 2nd larger rate than the 1st rate.
In order [of a shaft 34 and the drive shaft 40] to maintain the timing between rotations, as for this belt 40, it is desirable to make the rate to the shaft 34 of a shaft 40 into the cog belt or timing belt which has dependability in the ratio of 1:2 and increases to it.
The conveyor 10 is equipped with the chassis or base 20 which has the width of face typically approximated to the width of face of this conveyor. This tray 12 is supported on one pair of arms 18 which separated and left while connecting with each pivot type by the lower limit of this base 20, and the upper limit of this tray 12, and 22. In order to minimize wear of bearing, the rubber bushing of a conventional type may be used for each pivot point. This shaft 34 may be installed in the conventional-type bearing 37 attached in this base by suitable supporter like the perpendicular supporter 35 shown by drawing 2 . The shaft 40 is similarly installed in bearing 41 pivotable. The perpendicular supporter 42 of a conventional type fixes this bearing 41 to this base 20. If it depends on the die length of this conveyor tray, in order to support this tray, it should be understood that an additional tray support arm may be used and that these some of support arms may be connected with the floor installation device separated structural [this base 20] at a pivot type.
Two or more eccentric cranks 46, 56, and 66 are respectively supported by this drive shaft 40. Each crank may be equipped with the bearing race or outside ring attached in each one of the bearing hub which was eccentrically installed in this drive shaft 40, and was fixed to it, and these the crank arms 48, 58, and 68. It may be used in order that the same crank and each crank arm may link this drive shaft 40, this tray, or each counter weight as having been used within the crankshaft (referring to drawing 5). The link between this crank and this crank arm follows, produces a linear reciprocating motion substantially [each crank arm], and produces the late rate ahead of each crank arm, and a quick return rate for the rotational speed from which this drive shaft 40 under each rotation changes. The crank arm 48 is connected with the counter weight 52 by the rubber bushing 50 of a conventional type, and this weight is supported this time on one pair of counter weight supporters 54 connected with this base 20 at the pivot type. The crank arm 58 is similarly connected with the counter weight 62 by the rubber bushing 60, and this weight is supported on the counter weight supporter 64 connected with this base 20 at each pivot type. The crank arm 68 has linked the crank 66 with the same rubber bushing which it had on the horizontal bracing 70 extended between one pair of tray supporters 18. Therefore, as for

rotation of the drive shaft 40, the inside of the late half cycle produces ****** here and there [of this horizontal bracing 70, therefore a tray 12] before [comparatively late] the ** 1st, on the other hand, the next rotation in the quick half cycle of the drive shaft 40 serves as quicker return of this level supporter 70, therefore this tray 12, and the article which met this tray by that cause is slid.
Although this drive 24 is comparatively small in it, it has slack or play of the amount of ****** in practice, and it appears as an unpleasant mechanical knock in this drive.
When it accelerates a shaft 40 with a universal joint 32 or it is made to slow down, induction of this knock is carried out. Although this knocking is caused by the slack in this drive train (drive train), or overrun of components, it may cause high wear and early breakage of conveyor components. This knocking that is not desirable is removed substantially or practical as a result which uses two counter weight 52 and 62 which each drives through each crank and crank arm by the **** drive shaft 40. this -- each of two counter weight is good to prepare for the side which this drive shaft 40 faces as preferably shown in drawing 1 and drawing 2 .
in order to decrease destructive knocking of this conveyor drive substantially or to remove -- mutual -- and cranks 46 and 56 are respectively positioned so that migration of each counter weight may be begun in order of the rotation whose phase separated from migration of this tray by positioning of a crank 66 about 120 degrees. If it puts in another way, a tray 12 this crank 66 most to the front for example, when moving to the right in drawing 1 and drawing 2 Supposing the rotation location of this drive shaft 40 becomes 0 times, when this drive shaft 40 is 120 degrees, this crank 46 will move to the right in drawing 1 and drawing 2 depending on the method of the foremost of the counter weight 52 on the right of drawing 1 and drawing 2 . And in this crank 56, at the time of 240 degrees, each crank can attach timing so that this crank may move the counter weight 62 to the right most ahead. Making this 120-degree sequencing of this crank so few that it being surprised in the mechanical knock in this drive system, or supposing that there is nothing was shown. As for the desirable weight to each of this counter weight 52 and 62, it is desirable to choose as a function of the center of gravity of the weight of this tray 12, this tray, and this counter weight. It is increased by the weight of each counter weight 52 and 54 to the place where the lever arm length offered by the arms 18 and 22 for these trays has the equal maximum momentum substantially [it is longer, therefore / each counter weight] in the maximum momentum of this tray in the lever arm length of the counter weight supporters 54 and 64. Use of one counter weight which a phase separates about 180 degrees with this tray, and moves, or this tray indicated here and two counter weight which moves by the blank of a phase about 120 degrees offsets this momentum of this tray in this way, and on the other hand, this conveyor decreases knocking remarkably, or is removed and operated.
By using [rather than] two cranks of a phase blank this tray crank and about 120 degrees each about 180 degrees with migration of this tray using one counter weight of a phase blank, the reason which can decrease knocking of this drive remarkably is not explained easily, either, and is not easily clear, either, as indicated by the **'807 patent. Although the synthetic result which the crank arms 52 and 62 combined with each counter weight combined offsets the force of acting on this tray with sufficient performance so that min may be provided with the vibration or knocking in this drive system when this crank arm 68 is in the maximum acceleration, a crank arm 48 or all of 58 are not in the maximum acceleration. The instant acceleration of this crank arm needs to be taken into consideration in relation to the effect on the torque-arm die length from which the acceleration of each counter weight changes for the location of a crank arm. Since the weight of this tray 12, the counter weight 52, and the counter weight 62 is substantially equal respectively, the effectiveness caused by the maximum acceleration of this tray when combined with the torque-arm die length of this tray crank 66 in the moment of maximum acceleration is offset by the combination effectiveness of the moment acceleration of this counter weight 52 and 62 then combined with each torque-arm die length respectively. Having removed substantially knocking in which knocking in a conveyor drive exists by same conveyor which has one counter weight offset by 180 degrees to this tray movement and which is not desirable was shown by by using two counter weight respectively offset 120 degrees from movement of this tray.

Although the trial is not yet performed, knocking which this drive for differential impulse mold conveyors does not have is theoretically [at least] able to be attained by use of much counter weight from two. However, the profits of use of three counter weight are questions, and it is because, as for it, one counter weight probably removes a phase about 180 degrees to movement of this tray, and other two counter weight has removed the phase about 90 degrees each with movement of this tray and it is made to offset mutually. Each counter weight is able to make knocking of this drive system min by four counter weight offset 72 degrees from another counter weight. Positioning this tray crank on this drive shaft so that ****** may be put into operation regardless of the number of these counter weight by the angular position which this shaft chose here and there before this tray, each counter weight crank puts ****** into operation in a location here and there before each counter weight whenever [offset angle / as which this shaft to the angular position and two or more of other counter weight as which this shaft was this chosen was chosen beforehand]. Therefore, it gets down from a location to relational-expression A0=(360 degrees) / (N+1) substantially whenever [this preselected offset angle / of this shaft], A0 is [whenever / this offset angle] equal to a location here, and N is equal to the number of counter weight.
using four counter weight from two counter weight as a practical question, as shown in drawing 1 and drawing 2 -- ****** -- it is difficult. If four counter weight is used, probably two counter weight is positioned at each ** of this drive shaft. Since complexity occurs further by changing in the perpendicular height to this base of this counter weight, the example using four counter weight two counter weight arranges under this tray, and it can position at this drive shaft each ** -- as -- comparatively -- width of face -- whether narrow counter weight is required The path will be required through one of these the counter weight, in order to receive the crank arm to which it goes and comes back since another counter weight positioned at the side with this same drive shaft is driven. The four above-mentioned problems become still more complicated when using many counter weight. Knocking is not minimized by the reason explained about the example of three counter weight when using odd counter weight.
Therefore, it is the important description of this invention to have the drive shaft which had between separated between the two counter weight using two counter weight. These pivot members 69 and 50 and axis of rotation for 60 with this tray crank 66 and these counter weight cranks 46 and 56 being structurally the same preferably, and sufficient [each crank arms 48, 58, and 68] moving in the same horizontal plane substantially are good to be in the same horizontal plane which also contains axis of rotation of this drive shaft 40 preferably. As a theoretical problem, the center of gravity of each counter weight is in the same level as the center of gravity of this tray, therefore when the weight of this counter weight is equal to the weight of this tray, the maximum momentum of each counter weight becomes equal to the maximum momentum of this tray. When both this tray and this counter weight equip the same height as the center of gravity of this tray with the center of gravity of each counter weight to the base currently supported by the pivot type, the counter weight to which it goes and this comes back does not give the torque moment at all to the chassis or frame of this conveyor. However, as a practical question, the weight of each counter weight is adjusted so that this counter weight 52 and 62 may serve as a design with it and the maximum momentum of each counter weight may become equal to the maximum momentum of this tray like the above-mentioned explanation. [it is good to be desirably positioned at the bottom of this tray, then compact on these conveyors] However, the bending load to these support arms 54 and 64 and the weight of this counter weight 52 and 62 become min by positioning this counter weight in a comparatively short distance instead of a considerable distance under this tray. Therefore, as for the center of gravity of each counter weight 52 and 62, it is desirable that it is perpendicular to the direction to this tray center of gravity, and more nearer than the vertical position of each pivot shaft of these supporters 54 and 64 on this base. Preferably, the vertical separation between the pivot shaft of this supporter and the center of gravity of each counter weight is this at least 60% of supporter on this base on this base, and, as for the center of gravity of each counter weight, it is good that it is at least 60% of the vertical separation of this pivot shaft and the center of gravity of this tray.

It should be understood that both migration of this tray, ****** before this counter weight 52 and 62, and after ****** is controlled by migration of these crank arms 48, 58, and 68. If wished, in order to restrict pivot type movement of this tray supporter or A 18 and 22 and a counter weight supporter, or arms 54 and 64, you may have a halt machine on this base 20 (not shown). When [of this differential impulse mold conveyor 10] between each crank, and this tray pivot device 69 or each counter weight pivot device 50 and 60 is not linked, a **** intermediary also has [these halt machines] each of these arms 48, 58, and 68 good [migration length of each arm is not restricted working, but] for the assembly of this conveyor.
Although you may change in order that longitudinal direction spacing of a between may hold the timing belt 40 of various die length in the perpendicular height of these shafts and these shafts 34, it should be understood that this axis 72 of this intermediate shaft 34 is parallel to this axis 74 of this drive shaft 40. The location of these drive components between this base 20 and this tray 12 may be changed so that it may be wished to specific application.
Drawing 3 is drawing another example of the differential impulse mold conveyor 80. The same reference number as expressing the components of the above-mentioned explanation and the same components is used. In order to position the drive shaft 40 which is also the shaft preferably in desirable height, the electric motor 27 is installed in the motor supporter 29. This example shown in drawing 3 follows with this shaft, in order that it may repeat the rotational speed of the drive shaft 40 of this motor and may change it, it is using the controller 84, and thereby, it has avoided the need for a universal joint. Therefore, the conventional lead wire 86 interconnects this controller 84 and this motor 27, and the inside of each 1st rotational half cycle is the 1st rate about this motor, and is good to program this controller 84 to generate the desirable output for rotating this shaft at the 2nd larger rate than the 1st rate the inside of each 2nd rotational half cycle. The drive shaft 40 rotated the crank 66 and the crank arm 68 has linked this crank with one pair of tray supporters 18. The **** drive is equipped with the counter weight crank arm 48 linked with the counter weight crank 46 and this counter weight 52 supported on one pair of counter weight supporters 54 connected with the base 20 at the pivot type.
This motor 27 is controlled to carry out the direct development of the rotational speed which this drive shaft is desirable and changes, since a motor 27 serves as a brake of itself, in order to avoid knocking of this drive, slight attenuation is required or attenuation is not required. Therefore, this crank 46 that drives one counter weight 52 is offset at 180 degrees from this crank 66. Since this drive does not contain the components which generate knocking of ****** in this drive system, although this 2nd counter weight should be unnecessary, if wished, in the example of drawing 3 , one pair of counter weight and one pair of corresponding cranks which were offset 120 degrees each from this tray crank like the above-mentioned explanation can be used. It should be understood to have rotated this controller 84 as a result of a combination operation of the rate increase which the drive shaft 40 of the example of drawing 1 produces by this universal joint, and a pulley and a timing belt that it is good to be programmed to rotate this shaft 40 at the same rate. desirable in order to optimize movement of the article which the overall rate of this motor could change easily by having the programmable controller 84, and met this conveyor tray -- as -- instant rotational-speed change of this shaft 40 -- it can carry out. This controller 84 and this motor 27 may be supplied as one assembly, and may have the property [like an adjustable-speed servo motor] this whose motor 27 is in that case.
The drive 92 for differential impulse mold conveyors shown in drawing 4 is the same as that of the example of drawing 3 at the point currently used in order that a controller 84 may change the rate of this motor 27. In some application articles, the optimal migration length of the article which met the conveyor tray may have the whole rotational speed per minute in the neighborhood of about 200 rotations, and using the motor into which the rate of the this shaft in the 1st half cycle is changed at a different rate from the 2nd half cycle may be forbidden in cost. In order to change the rate of the this drive shaft in a half cycle, when the cost of a low-speed motor as shown in these objects for application articles with desirable using not a universal joint but a controller and drawing 3 is not guaranteed, in order to use the drive motor of low cost more substantially at high speed, a rate reduction machine (speed reducer) or a torque

multiplication machine (touque multiplier) may be used. In the application article from which the rate of this shaft changes with a controller 84, although this good better ****** reduction machine is the worm gear drive 94, 96 rotates this worm gear by this shaft here, and, subsequently this drive shaft 40 is rotated with this worm gear 96. Although there is a field where the example of this pulley and a belt generates overrunning torque and a mechanical knocking problem, the important advantage of this rate increase machine shown in drawing 1 and drawing 2 is the comparatively cheap cost of this pulley and a driving belt. As substitution for removing this mechanical knocking substantially by using two counter weight, although this worm gear drive 94 is used, it is because this type of drive does not have backlash substantially as for it, it is a self lock mold essentially, namely, rotation of this drive shaft 40 does not cause rotation of this worm gear 96 in practice by that design.
Since the overrun load of this drive shaft 40 follows and return transfer is not carried out by using the worm gear drive 96 to these worm gear 96 or this shaft 40, this drive is a device which does not essentially have feedback in which an overrun load is avoided. Moreover, a suitable worm gear drive may be equipped with biasing contact for smooth rotation of this power shaft to this input shaft. A suitable drive is an available HU25-2 mold drive (the Model HU 25-2drive mechanism) from the TEKISU TRON company (Textron, Inc.in Traverse City, Michigan) of Michigan and a traverse city.
It should be understood from the above-mentioned explanation that this drive motor 27 controlled by this controller 84 enables use of the cheaper drive motor 27 of cost which rotates at the rate of about 1700 rotations per minute. Subsequently, the desirable rate reduction for attaining rotation of this drive shaft in the mean velocity of about 200 rotations per minute may be attained by using the worm gear drive which has the rate reduction function of 8.5:1. It is being required that this example should control this shaft so that throughout [rotation term / of ** the 1st of about 1530 shaft rotations (41/4 times)] can make a controller 84 rotate this shaft at the 1st late rate and rotates throughout [rotation term / of ** the 2nd of 1530 shaft rotations] to it at the 2nd rate quicker than the 1st rate continuously in practice. Therefore, with this controller 84, as the example of drawing 3 shows, in order to attain rotation of the late rate of one half cycle of this shaft / rotation of the quick rate of one half cycle in some application articles, the rate of this shaft rather than it changes directly Cost effectiveness has the direction of offering a high-speed motor and a worm gear device comparatively, in order to slow down the variable speed of this shaft to rotation of the late rate of one desirable half cycle expected by this drive shaft 40 / rotation of the quick rate of one half cycle.
It should be understood from the above-mentioned explanation that it is because knocking with this drive considerable [it] in any way is not generated although the advantage of the example of drawing 4 is having only the counter weight 52 of one ** as compared with the example shown in drawing 1 and drawing 2 .
Furthermore, it should be understood about all of the example of the above-mentioned explanation that the drive shaft 40 may be connected with an additional attenuation unit. Therefore, since this drive shaft 40 shown in drawing 4 passes along the controllable back pressure bulb 98 and subsequently circulates through a fluid to a heat exchanger 99 before it is again returned to this pump 97, it is illustrating notionally the hydraulic pump 97 driven by this drive shaft 40. Therefore, the oil pressure attenuation system shown in drawing 4 uses torque required to rotate this pump shaft in order to attenuate rotation of this drive shaft, and thereby, it decreases vibration and knocking still more nearly further.
In order to decrease a knock as other attenuation systems, an adjustable MAG load may be used.
or [that the important advantage of the example of a variable speed motor shown in drawing 3 and drawing 4 has little backlash in this drive system with not requiring considerable attenuation and the need of being offset using one pair of counter weight, or slack] -- or it is that there is nothing. Therefore, in order to negate the effectiveness of movement of this conveyor, it is [that the counter weight of one ** only needs to be used, and]. The drive shown in drawing 3 and drawing 4 has avoided mechanical knocking which this drive system generates in the example of a universal joint as follows and can provide this motor with a required brake function

at the time of moderation. However, in much application article, the differential impulse mold conveyor which has the motor and universal joint of a conventional type should be understood to this tray movement being used being combined with two counter weight by which each was offset at 120 degrees, and being fond.
Drawing 5 and drawing 6 are drawing another example of the differential impulse mold conveyor 100 by this invention. In this example, this tray is driven by the fixed ** motor 26 which drives a gearbox 94 as an option. A suitable combination of a motor and a gearbox is the HM-3105 mold (Model HM-3105) gearmotor manufactured by Sumitomo (Sumitomo). This shaft 30 rotates the pulley 102 installed by carrying out eccentricity to this shaft 30. This drive shaft 40 is linked by this eccentric pulley 102 by the pulley 103 installed in the flexible belt 39 and the shaft 40 by carrying out eccentricity. It rotates with this belt 39, and eccentricity of the makeup (make-up) 104, i.e., idler pulley, of **** 1 is carried out to a shaft 105, and it is installed. It rotates with a belt 39 similarly, and eccentricity of the 2nd makeup pulley 106 is carried out to a shaft 107, and it is installed.
In order to maintain the desirable rotation of the drive shaft 40 which has a shaft 30 like said explanation except for slack from a driving belt 39 for which it opted beforehand, eccentricity of these makeup pulleys 104 and 106 is made the eccentric pulleys 102 and 103 and out of phase. For this purpose, it will be understood by this contractor that other eccentric compensators of the makeup pulleys 104 and 106 may be used. Late, the rate from which it is combined with the eccentricity of this pulley 103 that rotates this shaft 40, and the migration length of this belt 39 changes lengthens this tray 12 to the front, and lengthens push and this tray 12 back quickly, and a product is carried along with this tray.
one axis of these shafts 105 and 107 is good even if the spring deflection is carried out so that it may be further useful to maintaining the desirable tension on this belt 39 in order to rotate this drive shaft by the method beforehand decided to this shaft, and another body of revolution by which the spring deflection was carried out drives with this belt 39 or. The arm 108 is attached in the surroundings of the pivot 23 to these base components 20 or one of the 21 at the pivot type, and the shaft 105 is installed in the arm 108 pivotable like illustration. In order that a spring 109 may link the spring installation section 101 (fixed to this base), and this arm 108 and may absorb a small motion of an axis 105 by that cause, the desirable tension on this belt 39 is maintained.
In the example shown in drawing 5 and drawing 6 , axis of rotation of these shafts 30, 40, 105, and 107 is positioned at each corner of the virtual square which has the base side where each is parallel to the front face on which this tray 12 slides, and a head-lining side, and this virtual square side is respectively perpendicular to the front face of this tray. Therefore, the vertical separation between a shaft 30, level spacing between 107 and a shaft 40, level spacing between 105 and a shaft 107, the vertical separation between 105, a shaft 30, and 40 is equal. moreover -- each -- the maximum eccentricity of each pulleys 102, 103, 104, and 106 to each axis of rotation is equal. By supplying four pulleys installed in the corner of a virtual square by carrying out each eccentricity by each shaft which has the axis which separated between, uniform belt tension is maintained substantially.
Although this pivot arm 108 and a spring 109 are not required of some examples, this shaft 105 is rotated in that case around the shaft fixed to this conveyor base.
Therefore, although each of four pulleys 102, 103, 104, and 106 has the same diameter, since eccentricity of each pulley is carried out to each shaft and it is installed, the effective radius of each pulley is changing continuously. When the effective radius of a pulley 103 is long, the effective radius of a pulley 102 is short, and the instantaneous speed of the shaft 40 to the shaft 30 of constant speed is decreased by that cause, and the timing of a pulley 103 is set to a pulley 102 so that before ****** may be late and this tray 12 may be moved. Although it has an effective radius with a long pulley 102 when these pulleys 102 and 103 rotate 180 degrees respectively, and it has an effective radius with a short pulley 103 and this shaft 40 is rotated by that cause more [in instant] more quickly than this shaft 30, this tray 12 is made to return quickly in this way, and an article is slid along with this tray. The timing of each pulleys 104 and 106 is set, respectively so that the eccentricity of these pulleys 103 and 102 may be offset. By

using a cog belt or a timing belt 39, the timing that each pulley is desirable is maintained by homogeneity for the long period of actuation of a conveyor.
Although a pulley 103 can also be installed in this shaft 40 at this alignment, and the eccentricity of a pulley 102 and this makeup pulley, or a pulley must be then increased, that is because only the rate from which the migration length of a belt 39 changes turns into rotational speed from which this shaft 40 changes. The eccentricity which needs this pulley decreases by carrying out eccentricity of both the pulleys 102 and 103, and installing them in these shafts 30 and 40, respectively. Moreover, it may be used, in order that one makeup pulley may compensate this eccentricity and may keep uniform tension substantial on this timing belt 39. however, two makeup pulleys -- more -- desirable -- one makeup pulley -- ****** -- even if it is effective and a certain motion is in this shaft 105 by which the spring deflection was carried out, it changes slightly. The motion of a shaft 105 is very restrictive desirably, and in order to attain the very long life of this conveyor of operation, it should be understood in effectiveness that it is like [which is omitted]. Moreover, the spring deflection of a shaft 105 is removed in easy wearing of this timing belt to this pulley, and the case of being required, and enables re-adjustment.
Although drawing 5 is drawing the drive shaft 40 installed pivotable on one pair of conventional-type bearings 44, this bearing may be supported by this base 20 at the appearance explained above. Instead of [which was explained above] using a bearing mold crank like, an eccentric crank which is used with a conventional-type crankshaft is drawn on drawing 5 . Although this tray crank 106 is rotating by this drive shaft in order to make a crank arm 48 go, this counter weight 52 is made, as for this crank arm, to reciprocate shortly. Similarly, this counter weight crank 107 driven at this shaft 40 makes this tray crank arm 68 reciprocate, and this tray crank arm drives shortly the member 70 which links one pair of tray supporters 18.
a direct drive is carried out by this motor 26, or it wishes -- if it becomes -- the worm gear drive 94 between this motor 26 and this eccentric pulley 102 sake -- regularity -- and it drives at the rate slowed down substantially and this shaft 30 is rotated with constant speed. The counter weight 52 moves to an opposite direction to this tray, and negates vibration of a tray to the above mentioned appearance. If wished, it is good to use two counter weight, and the example of these two counter weight has it, especially when [comparatively large] following and driving a heavy tray. [more advantageous than one counter weight]
Drawing 6 is illustrating this tray supporter 18 and this counter weight supporter 54 which were installed in this base 20 by the pivot type. This tray supporter 22 is installed in the base 21 structurally separated from the base 20. If drawing 5 is referred to, in order to make it reciprocate by the method explained before this tray 12, this tray crank arm 68 is driven with the crank 67 rotated at this eccentric ceremony. Similarly, since this counter weight 52 is driven to an opposite direction, this counter weight crank arm 48 is driven with the crank 47 rotated at an eccentric ceremony. If each of these pulleys 102, 103, 104, and 106 has the same diameter of 10.16cm (4 inches), the eccentricity of each pulleys 102 and 103 will be 1.
If it is 9cm (0.37 inches), the ratio of the maximum rotational speed in this drive shaft 40 and the minimum rotational speed will be set to about 2.2:1. By increasing to 1.08cm (0.42 inches), the maximum rotational speed of this drive shaft 40 compared with the minimum rotational speed of the drive shaft 40 can control the eccentricity of these pulleys 102 and 103 to about 2.4:1.
Although the example shown in drawing 5 and drawing 6 has the advantage of simplicity, rotational-speed fluctuation periodic to the purity of this shaft raised by carrying out efficient migration of the article which met this tray by this eccentric pulley is not so desirable as the example explained to others.
Drawing 7 is cm (inch) about tray migration length as a function of the motor location expressed with whenever, and is drawing the tray rate in cm (inch) per per second. Refer to the angular position of this shaft 30 in this example shown by drawing 1 and drawing 2 for this motor location used by drawing 7 and drawing 8 . This tray migration length drawn by drawing 7 and drawing 8 , a tray rate, tray acceleration, and torque are specific objects for conveyors which have about 4.19 centimeters (1.65 inches) tray migration length. Although the force of acting on these conveyor components increases, therefore longer tray migration length requires probably more large components more strongly, in order to move an article along with this conveyor, longer tray

migration length is desirable.
It is illustrating that the graph line 110 is plotting tray migration length as a function of a motor location, and the maximum migration length is at the top 112. Although tray migration length becomes zero substantially the point 114 on the graph line 110, it expresses the location which was able to be drawn most to these trays. To the appearance explained with United States patent No. 5,351,807, a timing angle negative in the example of this universal joint is desirable, and a desirable timing angle is [about]. -It is 6 times. Therefore, as shown in drawing 7 , when this motor location is about 168 degrees, the location of zero occurs [migration length]. this shaft 30 -- all -- between 360 rotations -- therefore, this tray moves to before ****** to the highest migration length of the point of a point 112, retreats to the migration length of the substantial zero of the point of 114, and moves to before ****** and after ****** again along with the plot line which subsequently reproduces the plot line 110. With the drive of 1:2 supplied by these pulleys 36 and 38, this drive shaft 40 is rotated twice to one rotation each of this shaft 30, therefore one rotation of this drive shaft becomes ****** and one return movement here and there [of this tray] before one.
Moreover, drawing 7 is drawing the tray rate as a function of a motor location. The maximum tray forward direction rate of 584 millimeters/s (about 23 inches) generates the plot line 116 on the plot line 116 top top-most vertices 118, and it is illustrating corresponding to about 19 motor locations. The maximum tray negative direction rate of 508 millimeters/s (about 20 inches) is generated in the motor angular position of about 154 degrees.
The plot line 130 of drawing 8 is drawing tray acceleration as a function of the angular position of this shaft. Although it starts from the location of zero include angle and tray acceleration falls rapidly per second per second to the tray maximum deceleration of 8.8 meters of minus (29 feet of abbreviation minus), this happens at the point 132 corresponding to the angular position of about 37 degrees. Tray deceleration decreases after that and, subsequently is again increased gradually to the point 136 on the plot line 130. Subsequently, although tray acceleration increases to top-most vertices 25.6 meters/s (about 84 feet) per second, it is generated in the motor location of about 177 degrees. between the angular positions of this shaft which are rotating this plot line 130 from about 0 times to about 20 degrees -- this -- sudden tray acceleration changes rapidly and changing from about 150 degrees rapidly again between the angular positions of about 175 degrees is shown. The maximum tray acceleration happens, when a tray can be drawn substantially. Although acceleration reduction near the point 134 of the plot line 130 is not necessarily desirable, in the example of a universal joint, it generates essentially.
Moreover, drawing 8 is drawing torque in the kilogram (pound) per cm kilogram (inch pound) as a function of a motor location. Generating the maximum torque at the top-most vertices 142 of the plot line 140, torque serves as min at a point 144 after that. After that, torque increases at a point 146 and, subsequently decreases again to the negative maximum in a point 148.
About 4.19 centimeters (about 1.65 inches) tray stroke (stroke)
As the ratio of the maximum and the minimum rotational speed is in the range of 2.2:1 thru/or 2.6:1, this drive shaft rate should be controlled by the differential impulse mold conveyor which ****. When this article reaches by the ramp in this application article and it needs to be moved on a hill, it may be increased to the range of 3.0:1 to 4.0:1 by this drive shaft velocity ratio.
It is an object for the examples of the universal joint which shows the graph of drawing 7 and drawing 8 to drawing 1 and drawing 2 like which were before careful of. However, these graphs offer the prospect which is worthy about the desirable program for speed control of the shaft of the example shown in drawing 3 and drawing 4 . More specifically, the ideal computer program for controller 184 is likely to become a different plot line a little from it which shows drawing 5 and drawing 6 . Furthermore, although the swelling of 134 should be removed ideally or the Yoshinari ****** should be carried out if specified, it is programmed to follow in footsteps of an accelerating curve 130 in general. Therefore, this acceleration is substantially fixed between a point 132 and a point 136.
Drawing 9 is illustrating the suitable linkage 150 for linking a tray among the supporters 22 and 18 which separated and left for one pair. This tray 12 includes the perpendicular side faces 14 and 16 for holding this article on a in general level back face and this back face of this tray by

the flatness for moving an article along with this tray like said explanation. The upper limit of each tray flank contains the curved lip section 161 which is shown in drawing 9 . These supporters 22 and 18 are supporting the tray 12 through this linkage 150 jointed with this lip section 161 in this way. In order to support the opposite side 14 of this tray from the same legs 22 and 18 for support, the same linkage as the opposite side of this tray 12 is used.

This linkage 150 possesses the frame 152 which has the upper limit which has a taper with the configuration jointed with the round lip section 161 of this conveyor. In order to clarify other components explained below, the left-hand side end plate is not shown in drawing 9 , but this frame 152 is good to have an end plate, in order to stop the interior of this linkage 150 substantially. Among these frames 152, respectively, the upper limit of an outside and these supporters 22 and 18 is equipped with the path 156 where it had consistency for receiving a bolt 158 or other conventional-type members, in order to install this linkage 150 structurally on this supporter 18 and 22. Although extended among the supporters 18 and 22 which separated between, it may be separated from this supporter about 1m, and thereby, the long die length of this clamp device 150 joints it with the lip section of this tray, and, as for this linkage 150, it is supporting this tray on it by the dependability **** method. The long and slender flange 160 extended outside from the round corner 15 of this tray 12 is carrying out the configuration which considers monotonous jointing as the plate 162 with which the upper part of this frame 152 inclined like illustration. When this linkage 150 is in the released location, this tray may slide [as opposed to / therefore / this connection frame 150] on a longitudinal direction to these supporters 18 and 22 and this conveyor base 20 in this way (to the direction of an article moved along with this conveyor, and opposite direction).

The clamp bar 164 is positioned at the top face of this frame 152. This clamp bar 164 is carrying out the tabular configuration of having the long and slender notching 166 along the up inferior surface of tongue, in order to receive this tray flange 160. The hole 170 of two or more rectangles is having between separated along with the plate 162 with which this frame 152 inclined, and is having between separated along with the die length of this frame. Two or more corresponding U character mold string-like loop formations 168 are welded to the inferior surface of tongue of this clamp bar 164, and it has a dimension and spacing to which each fits in in each hole 170 of this frame 152. In order to clamp or release this frame 152 from fixed jointing with this tray 12, it has the long and slender cam member 172. This cam member possesses the handle 176 for rotating manually the long and slender rod 173 and this rod 173 which have the flat cut 174 along the die-length direction in a in general cylindrical cross-section configuration. In order to offer a pivot point so that this clamp bar 164 may be slightly rotated to this frame 152 although two or more **** 178 for a set is having between intermittently separated along with the die length of this clamp bar 164 and explain below, it is extended below to jointing with the plate 162 which this inclined.

In this way, this frame 152 is substantially installed on the perpendicular supporter 18 and 22, and this clamp bar 164 is set on this frame so that this loop formation 168 may fit in in each hole 170. Subsequently, although this rod 173 slides on between these loop formations 168 under the plate 162 which this inclined, it is parallel to the inferior surface of tongue 180 of this plate 162 that inclined ****** 174. Since this handle 176 will be raised manually or it will be lowered once this tray is positioned in a longitudinal direction to this clamp device 150 in the desirable location, this rod 173 rotates in this U character mold loop formation 168, and the cam operation between the inferior surfaces of tongue 180 of the plate 162 which this inclined the external surface which this rod 173 curved with this loop formation 168 is made to perform. In this cam operation, push and these two or more **** 178 for a set act this clamp bar 154 as one pivot actuation line below effectively. Since the upper limit of this clamp bar 164 is pressurized to the flange 160 of this tray 12 by the force of ****** in this way, this flange 160 is pinched fixed between this clamp bar 164 and this frame 152, and, thereby, fixes the location of this tray 12 to these supporters 18 and 22. A cam operation of this rotation rod 173 fixes this tray 12 to this connection frame 152 by friction in this way.

When this handle 176 turns a bar 173 to the jointing location or fixed position, this flat part 174 has an include angle to this side 180. This flat part 174 of this rod 173 is parallel to the inferior

surface of tongue 180 of the inclined plate 162 in a release location, as shown in drawing 9 . If this cam operation rod 173 rotates in the release location, this clamp bar 164 is removed from compulsive jointing with this flange 160, and can slide on this tray easily in a longitudinal direction to this linkage 150. After checking this conveyor drive and cleaning the range under this working-level month tray, this tray is fixed again in location by returning to the location of the origin of it and rotating this cam operation rod 172 to the cam location.
This tray is moved to a longitudinal direction by this conveyor tray, and the **** clamp device 150 makes it possible to be easily fixed to this location subsequently from it, in order to reach the optimal point of fall of an article to a scale etc., for example.
this frame 152 -- this tray 12 -- dependability -- since it fixes highly, it is evaluated by this contractor that various cam mechanisms can be used -- I will come out. If wished, the configuration of this cam rod 172 may be adjusted so that the cam applied force between this rod 173 and the inferior surface of tongue 180 of this connection frame 152 may increase or decrease as a function of the angular position of this rod 173. In another example, this tray is supported on a cam rod and the part of this connection frame is positioned on the lip section 161 with this round tray. In this example, it rotates in a cam operation location, and since this fixes the location to this frame of this tray, this cam pressurizes this tray to this rest frame upwards. If it rotates to this cam rod release location, this tray separates from the top-most vertices of this connection frame, and descends slightly, and, thereby, it can be slid on this tray along with this cam rod for the purpose of cleaning or adjustment.
Drawing 10 is drawing another example of the linkage 184 equipped with the frame 186 installed in the upper limit of supporters 18 and 22. The link member 188 is attached in this frame 186 at a pivot type, and the roller 190 is installed in the upper limit of each link member 188, in order to joint with the lip section 161 which this tray curved. The connector bar 192 links this link member 188. It connects with this frame 186 at a pivot type, the handle 194 is pivotable around an axis 195, and in order to raise this roller 190 alternatively and to lower and carry out between the tray lock location of a continuous line, and the tray release locations of a dotted line (dashed lines) in drawing 10 , it is linked by this connector bar 192. One pair of handle parts (lug) 196 in which each has the cross-section configuration of three square shapes are fixed to this conveyor 12 side. A plate 198 is positioned after this frame 186, and is installed possible [adjustment] on it, and in order to receive each handle part 196, it has the notching 199 of 1 to three square shapes.
Since this connector bar 192 makes a pivot type rotate this link member 188 substantially so that perpendicularly, and makes it joint with the lip section 161 to which this tray turned this roller 190 by that cause and this tray is raised upwards to this frame 186 when this handle 194 is in immobilization or the lock location of this tray, each handle part 196 fits in in each of the notching 199 in this support plate 198. Since longitudinal direction jointing of this handle part 196 and the halt mold operation which have this supporter 198 fix [rather than] this tray 12 to this linkage 184 depending on friction or a clamp operation as used in the example of drawing 9 , it is used. In order to promote this tray, by using the handle part of three square shapes instead of friction, the clamp force which this linkage takes decreases substantially. A late front, in this way, ****** and quick return movement are transmitted to one pair of handle parts 196 here and there, in order to move this tray 12 from these arms 18 and 22 to this frame 186 subsequently to this support plate 198. If it joints with the edge 116 which this tray curved in order that this wheel 190 may support this tray, ****** / movement of quick return will be transmitted between these supporters 18 and 22 and this tray through the handle part 196 of this 1 pair here and there before this ****. This linkage 184 is locked by this location by offering the suitable halt section 200, in order to joint with this handle 194.
Although this halt section 200 is removed in order to move this tray 12 to a longitudinal direction to these supporter arms 22 and 18, it is for raising this handle 194, and carrying out the tilt of this link member 188 by that cause, and reducing this tray 12 to these supporters 22 and 18 by that cause. Once the handle part or the halt section 196 of these three square shapes separates from jointing with the same movable jointing member with this each of slot 199 or two or more supporters 22 and 18, this tray 12 is movable in a longitudinal direction on one pair of inclination

rollers 190. This tray may begin to be rolled in location for the purpose of cleaning like the above-mentioned explanation in this phase.
In order to attain the longitudinal direction adjustment to these supporters 18 and 22 of this tray 12, the regions-of-back support plate 198 is installed movable on this frame 186. This support plate 198 is stuffed, and one pair of bolts 202 for a lock pierce through each slot 204 of this frame 186, and you may let them pass. By loosening this bolt 202, the location of this support frame may be horizontally adjusted to this frame 186. If the desirable longitudinal direction location of this tray 12 is attained, this bolt 202 fixes the location of the eclipse with re-bundle, and this [as opposed to this tray by that cause] notching 199.
The linkage shown in drawing 9 and drawing 10 conforms well to connect an impulse conveyor with a perpendicular supporter alternatively substantially [plurality], or separate [which inputs drive movement into this conveyor tray so that ****** / back return movement may be generated here and there / desirable / late / before / of this tray] in order to move an article along with this tray. In order to transmit desirable movement to this tray, this tray supporter is good to be used for the two ways for supporting this tray, when moved to a longitudinal direction to the supporter of this plurality for cleaning under this tray. Instead, this linkage supports this tray, when driving by ****** / quick return movement here and there [the / late / before], and the roller and guide which were positioned at the bottom of this tray are jointed with this tray in order to support and guide this tray, when moved to a longitudinal direction for cleaning. This linkage can also be jointed with other suitable members fixed to another flange or this tray, although it has the intention of this linkage indicated here so that it may especially joint with the up lip section which this tray side curved when moved for cleaning of this tray. Therefore, although this tray is desirably positioned at the time of actuation, in order for this linkage to clean the range under this tray, it is moved from the path to a longitudinal direction, and subsequently this tray is easily returned to the location or the location adjusted newly of the origin of it to this supporter.
According to the approach of this invention, an article is conveyed by positioning a tray in the front and an opposite direction movable, but as for this tray, it is desirable to be supported by the leg which indicated on this base in the lower limit, and indicated it by upper limit here and which was respectively fixed to this tray like at a pivot type.
It is controlled so that the rotational speed of a shaft is the 1st rate throughout [rotation term / of ** a 1st] and rotates this shaft at a larger rate than this 1st rate throughout [rotation term / of ** a 2nd]. Therefore, it gets down from the self-sustaining include angle (angular duration) of this 1st turnover period and the 2nd turnover period to the class of drive which gives power to this conveyor. Furthermore, if specified, this drive [whether the universal joint shown in drawing 1 and drawing 2 is used and] It depends on whether the configuration of the eccentric pulley and belt which are shown in whether the motor of the computer control which has the rate reduction machine which shows drawing 4 whether the motor of the computer control which connected directly between this shaft shown in drawing 3 and this crank is used is used, drawing 5 , or drawing 6 is used. As for this shaft and a tray, in any case, it links, and has one or more movable counter weight respectively to this tray, and this motor and each of these one or more counter weight are linked.
In this way, the approach of this invention is using the drive motor which moves a tray to before ****** and after ******, it is the 1st rate between each 1st rotational half cycle, and, as for this motor, a drive shaft is rotated at the 2nd larger rate than this 1st rate between each 2nd rotational half cycle there. In many the examples, two or more movable counter weight is respectively supported to this tray including the specific example which uses a universal joint for this drive. This drive shaft and each of two or more counter weight are linked so that migration to the front of each counter weight may be put into operation by the angular position as which this shaft that puts migration to the front of this tray into operation was chosen, and the drive shaft angular position beforehand chosen to the both sides of two or more of other counter weight. The 1st and 2nd counter weight is preferably good to prepare for the side which this drive shaft faces respectively. In that case, the 1st counter weight crank links this drive shaft in the 1st counter weight by whenever [offset angle / of about 120 degrees] to the angular

position as which this drive shaft was chosen. The 2nd counter weight crank links this drive shaft and the 2nd counter weight whenever [offset angle / of about 240 degrees] in a location to the angular position as which this drive shaft was chosen.
The example of the above-mentioned explanation has given power to this tray by the electric motor. It will be recognized by this contractor that this motor element is realizable with various means. In some application articles, an oil pressure drive motor or an electric control servo motor may be desirable. The mechanical link between these supporters for a **** drive shaft, the object for trays, or counter weight has been explained as an eccentric crank and a crank arm here. the example indicated here -- each -- an eccentric bearing mold crank -- or a crankshaft mold crank may be used. In order to attain the desirable reciprocating motion which answers an adjustable drive shaft rate, other crank link may be used between this drive shaft and these driven components. ****** and quick return movement can be produced before [desirable / late] this conveyor tray here and there in a profile with the suitable cam which was turned to the shaft of fixed ** and combined with the cam follower by which the spring deflection was carried out. The drive shown in drawing 1 thru/or drawing 6 for that simplicity and high dependability at this time is desirable. Although the same rubber bushing as these bushings 50, 60, and 69 of the edge of these arms 18 and 22 for tray support, these arms 54 and 64 for counter weight support, and these crank arms 48, 58, and 68 may be used, the various bushings and bearings of a class can be used instead of a rubber bushing. Moreover, not the arm for support but other linearity bearing members may be used in order to support this tray and/or one or more counter weight on a common base or the base separated structurally. Although one pair of counter weight may be used in any example, it is not required of the example of drawing 3 thru/or drawing 6 . Therefore, this tray can take various gestalten in an application article.
Other various transformation is clear to the approach of giving power to the differential impulse mold conveyor indicated from the above-mentioned explanation of a desirable example here, and a conveyor. In this way, although this invention was attached to these examples and explained to the detail, this explanation is for an illustration and it should be understood that this invention is not limited to these examples. If this indication is touched, substitute components and a substitute actuation technique are clear to this contractor. Additional transformation can be considered in this way, and although made, they do not separate from the pneuma of this invention specified by the claim.

[Translation done.]